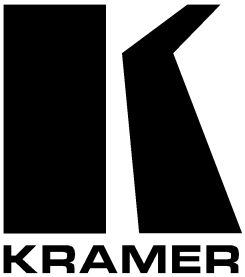
Kramer Electronics, Ltd.



USER MANUAL

Model:

Cobra T2

Video / RS-232 Transmitter

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1 Introduction

Welcome to Kramer Electronics (since 1981): a world of unique, creative and affordable solutions to the infinite range of problems that confront the video, audio and presentation professional on a daily basis. In recent years, we have redesigned and upgraded most of our line, making the best even better! Our 500-plus different models now appear in 8 Groups[1], which are clearly defined by function.

Congratulations on purchasing your Kramer TOOLS **Cobra T2** *Video / RS-232 Transmitter*, which extends VGA and serial signals over ordinary Category 5 cable. This unit is field configurable for various video, audio and serial options (see Appendix D for configuration settings).

The **T2** series feature video and RS-232 signals on a single CAT 5 cable.

The package includes the **Cobra T2** *Video / RS-232 Transmitter* and this user manual[2].

The Kramer **Cobra** series products are not compatible with Kramer non-**Cobra** series products.

2 Getting Started

We recommend that you:

- Unpack the equipment carefully and save the original box and packaging materials for possible future shipment
- Review the contents of this user manual
- Use Kramer high performance high resolution cables[3]. You may also need 1/8" (3.5mm) audio cable, video cable with HD15 connectors, serial cable with DB9 connectors, and CAT5 cable.

1 GROUP 1: Distribution Amplifiers; GROUP 2: Video and Audio Switchers, Matrix Switchers and Controllers; GROUP 3: Video, Audio, VGA/XGA Processors; GROUP 4: Interfaces and Sync Processors; GROUP 5: Twisted Pair Interfaces; GROUP 6: Accessories and Rack Adapters; GROUP 7: Scan Converters and Scalers; and GROUP 8: Cables and Connectors

2 Download up-to-date Kramer user manuals from the Internet at this URL: http://www.kramerelectronics.com

3 The complete list of Kramer cables is on our Web site at http://www.kramerelectronics.com

3 Overview

Our Kramer **Cobra** series products are compatible with Cat5/5e/6 data cabling as well as skew free CAT5/5e cabling manufactured for video applications. Note that some skew free Cat5 is specific to a particular vendor and is not compatible with our products. Ensure any skew free CAT5 cable is non-proprietary prior to purchase / installation.

We recommend using our Kramer **Cobra** ultra low skew cable—**BC-HDTP** (solid bulk) or **BCP-HDTP** (solid plenum bulk)—available in lengths of 700' (210m) and 1300' (390m).

CAT6 cable, due to the manufacture method, can exhibit much greater skew than standard CAT5/5e and may require skew compensation beyond what the standard product offers. Contact Kramer Electronics for assistance.

CAT5/5e/6 cabling for this product must be pinned to the TIA-EIA T568B wiring specification (see appendix A). We also highly recommend that all CAT5 cables be pre-terminated and tested. Cables terminated on-site or in an existing infrastructure should be tested before use to ensure compliance with the TIA-EIA T568B specification. Using incorrectly terminated CAT5 cables can damage this product.

Achieving the best performance means:

- Connecting only good quality connection cables, thus avoiding interference, deterioration in signal quality due to poor matching, and elevated noise levels (often associated with low quality cables)
- Avoiding interference from neighboring electrical appliances that may adversely influence signal quality and positioning your **Cobra T2** in a location free from moisture and away from excessive sunlight and dust

Caution – No operator-serviceable parts inside unit.

Warning – Use only the Kramer Electronics input power wall adapter that is provided with this unit[1].

Warning – Disconnect power and unplug unit from wall before installing or removing device or servicing unit.

Warning –This equipment is not intended for, nor does it support, distribution through an Ethernet network. Do not connect these devices to any sort of networking or telecommunications equipment!

1 For example: model number AD2512C, part number 2535-000251

4 Setup and Installation

Data Mode Configuration (RS232 and S2 versions)

The Kramer **Cobra T2** *Video / RS-232 Transmitter*s are configured in full modem bidirectional serial modes. If you are using the daisy chain receivers or a multi-output transmitter a CAT5 matrix switch or CAT5 distribution amp, this mode must be changed to uni-directional broadcast. To do this, configure the internal Serial Daughterboard (SDB) to change the transmitters and receivers serial mode operation (see Appendix E). This configuration should be done before making any cable connections and applying power.

Alternatively, remove the internal daughterboard and use the transmitters built in simplex serial option with the appropriate jumper changes.

With regard to connecting the cables:

- We recommend mounting and connecting all cabling to the **Cobra T2** *Video / RS-232 Transmitter* components before applying power.
- Be sure that the CAT5 cable you intend to use has been tested to comply with the T568B wiring specification (see Appendix A).

4.1 Making the Connections

This section contains figures showing connections with the specific **Cobra** Series models. In general, however, the connection and setup procedure at both transmitter and receiver ends is as follows:

NOTE: all units must be the same type for all supported features to function correctly. For example, a **Cobra T2** *must be connected to a* **Cobra R500-2** *for the serial signals to function. You cannot use the serial option with a* **Cobra T2** *and a* **Cobra R500-2** *that is configured for simplex serial. Similarly, a* **Cobra T2** *cannot be used with a* **Cobra R500A**. *Video modes may function normally, but 4th pair options will not.*

At the transmitter end:

1. Connect the source video to the **Cobra T2** Series transmitter video input port, which is an HD15 connector labeled VIDEO IN.
2. If desired, attach a local monitor via the local monitor port to LOOP OUT.
3. Make your audio or serial connections via the AUDIO/AUX I/O connector or DB9 connector as appropriate.
4. Connect the CAT5 cable to the transmitter.
5. Apply power on the transmitter. The LED should light and, if there is a local monitor attached, a video image should appear on the monitor's screen.

At the receiver end (refer to the receiver user manual):

1. Connect the VIDEO OUTPUT HD15 connector to the display unit, and attach any audio (AUX I/O) and/or serial connections (RS-232) depending on the model of the **Cobra** CAT5 Video System.
2. Connect the CAT5 cable to the LINK INPUT connection. If daisy chaining units, connect the output CAT5 cable to the LINK OUTPUT connection.
3. Apply power. The LED should light and video should appear on the display (make sure display is powered ON).
4. Adjust video levels and skew compensation per appropriate receiver manual.

4.2 Connections on the Single-Port VGA/RS-232

The Single-Port **Cobra T2** CAT5 Video System with RS-232 supports video and full-modem serial (RS-232) signals over CAT5 cable. You can also use the transmitters and receivers to make video-only connections without serial communications. Figure 1 shows the Single-Port **Cobra T2** CAT5 Video System with RS-232 Transmitter connections.

NOTE

Even though both transmitter and receiver units contain audio jacks, audio is not supported on the RS-232 version. Plugging in audio cables may interfere with the RS-232 serial communications.

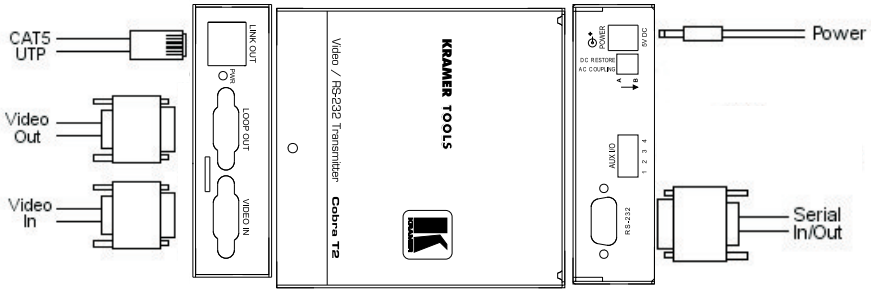


Figure 1: Connecting the Cobra T2

NOTE

Serial communication mode is unidirectionally broadcast when using transmitters and daisy-chained receivers. In this mode, all other devices must be of the simplex serial type. For more information, contact Technical Support.

5 Solutions to Common Problems

In most cases, nearly every issue with the **Cobra T2** CAT5 Video System can be resolved by checking the CAT5 termination and making sure that it's pinned to the TIA/EIA 568B wiring specification. However, there may be other problems that cause the system to not perform as it is designed. Below are solutions to the most common installation errors.

Problem:	No video signal at the transmitter local port or at the receiver.
Solution:	Check that both units are powered. **Ensure receiver EQ adjustment is set correctly — turn knob slowly.** Make sure the CAT5 cable is terminated correctly per the TIA/EIA 568B wiring specification. Is the display device powered on and functioning? Check to ensure display settings (resolution, refresh rate, and so on) are compatible with input signal. In some cases, the video termination may be mismatched. The transmitters and receivers ship with 75-ohm termination as the default. To disable termination, see **Appendix B**.
Problem:	Poor video quality.
Solution:	Have all receiver adjustments been finished? **Ensure EQ adjustment is set correctly — turn knob slowly.** Check all cable connections. The video signal's refresh rate may be set too high. Reset to a lower refresh rate in your monitor-configuration menu. There may be a delay skew issue. See the section on Skew in the receiver manual. There may be a DDC compatibility problem. See **Appendix G**.
Problem:	Poor audio quality.
Solution:	Powered speakers are required. Make sure speaker power is ON. Check input source levels from the source device. Make sure the audio source is not overdriven or underdriven. Audio is summed left and right for "A" versions. If using a single channel, both audio inputs must be connected at the transmitter end for full audio gain. Audio is line level. S2 serial//audio units support full stereo line level. A high frequency noise may be heard if the cat5 cable from the transmitter is disconnected, or the transmitter is not powered up. This is normal and will disappear once a complete link connection is made. If Daisy Chaining, audio termination must be removed in DP units. Only the last receiver requires termination. For S2 units a special un-terminated version must be used between transmitters and the last receiver with a standard End-Of-Line unit installed at the end. S2 units cannot be terminated/ unterminated in the field.

Problem:	Serial communication doesn't work correctly.
Solution:	Are the serial devices connected properly? Are the serial parameters correct for source/destination devices? Are the serial cables terminated correctly? If a null-modem cable is used, it must be placed at the receiver end. When using RS-232 transmitters or receivers in daisy chains, Cat5 switches, Cat5 distribution amps, or Multi-output transmitters, the serial signal is a unidirectionally broadcast mode only. In this mode, all other **Cobra** CAT5 Video System devices must be the simplex serial type. For assistance, contact Technical Support. The last device in a T4 transmitter or daisy chain configuration must be a receiver unit with a terminated serial board. See **Appendix E** for Serial board settings. External switch for last unit in daisy chain.
Problem:	"Green shift" or "green washout" on multimedia signals.
Solution:	The standard video/serial model is designed to function with DC coupled signals in which the black level is referenced to 0 volts. Nearly all VGA cards function this way. Some media servers, however, provide AC coupled signals and can cause a green color shift in the video. This is a result of the sync clamping on the red and blue channels of the video/serial model. For five-component (RGB/H&V) AC coupled video, the **Cobra** CAT5 Video System T2 Universal transmitter has been designed with full DC restoration capability.

Appendix A Cabling Pinouts

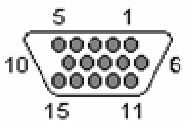


Table 1: HD15 Video Connector PINOUT

Pin	RGBHV (VGA)	RGBS	RGsB	Composite	SVHS (Y/C)	YUV
1	Red +	Red +	Red +		C+	V+
2	Green+	Green+	Green+	C+	Y+	Y+
3	Blue+	Blue+	Blue+			U+
4	—	—	—			
5	Gnd	Gnd	Gnd			
6	Red-	Red-	Red-		C-	V-
7	Green-	Green-	Green-	C-	Y-	Y-
8	Blue-	Blue-	Blue-			U-
9	—	—	—			
10	Gnd	Gnd	—			
11	Gnd	Gnd	—			
12	—	—	—			
13	H Sync	C Sync	—			
14	V Sync	—	—			
15	Gnd	Gnd	—			

Table 2: Terminal Block PINOUT

PIN	Audio	S2 Audio*	Simplex Serial	SPDIF Audio	Composite Video
Pin 1	Left Channel	Left Channel	Tx	Signal +	Signal +
Pin 2	Ground	Ground	ground	Signal -	Signal -
Pin 3	Right Channel	Right Channel	-	-	-
Pin 4	-		Shell	-	-

**S2 audio channels are reversed at the receiver end. Left audio is on pin 3 and right audio is on pin 1.*

Appendix A Cabling Pinouts

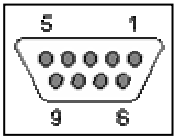
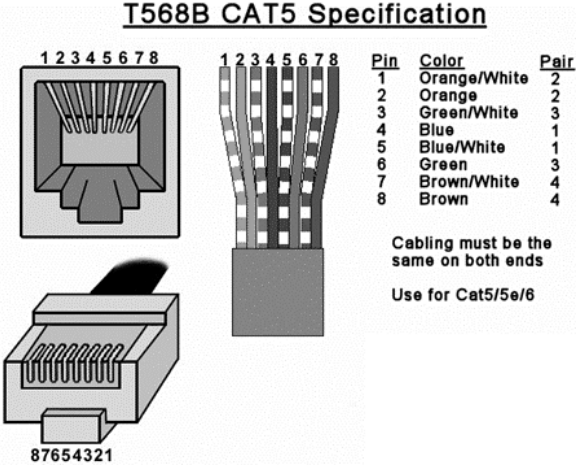


Table 3: DB9 Female Serial connector

Pin	Full Duplex	3 wire (S2)	Simplex
1	DCD		
2	RX	RX	
3	TX	TX	TX
4	DTR		
5	Ground	Ground	Ground
6	DSR		
7	RTS		
8	CTS		
9	RI		

Table 4: T568B CAT5 PINOUT



Appendix B Setting Sync Signal Output Termination

In some cases, it may be necessary to disable the 75-ohm termination of the video outputs on the **Cobra** CAT5 Video System units. This can be done by opening the case of each unit and installing jumpers on the circuit board. The settings disable/enable the 75-ohm termination on individual units. For instance, changing a transmitter termination affects the local monitor port only, it doesn't affect the receivers. Conversely, changing a receiver affects the output port of the receiver, not the transmitter. The following illustrations show the jumper locations for the **Cobra T2** unit.

75-ohm sync termination:

To enable: Both jumpers OUT (Default)

To disable: Both jumpers IN

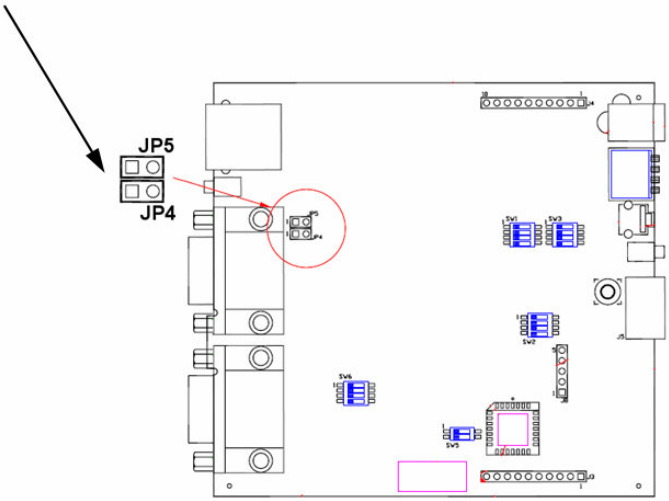


Figure 2: Setting Sync Signal Output Termination

Appendix C DC Restore to fix Green Shift of AC Coupled Signals

The standard **Cobra** product is designed to function with DC coupled signals with the black level referenced to 0 volts. Nearly all VGA cards function this way. However, some media servers or digital camera devices provide AC coupled signals and can cause a green color shift in the video. This is a result of the sync clamping on the Red and Blue channels in the **Cobra**. The **CobraT2** transmitter has been designed with full DC restore capability. A simple switch setting is all that is required.

The following diagrams show the switch location and settings for the **Cobra** Universal Transmitter assembly.

Note: Switch settings other than shown below may result in unpredictable performance and are not supported by Kramer.

DC restore / AC coupling options:

Disable: (Default)	**AC Coupling to A** **DC Restore to A** **Internal SW5 position 1 OFF (default)**
Mode 1 Enable	**AC Coupling to B** **DC Restore to B** **Internal SW5 position 1 OFF (default)**
Mode 2 Enable	**AC Coupling to B** **DC Restore to A** **Internal SW5 position 1 ON**

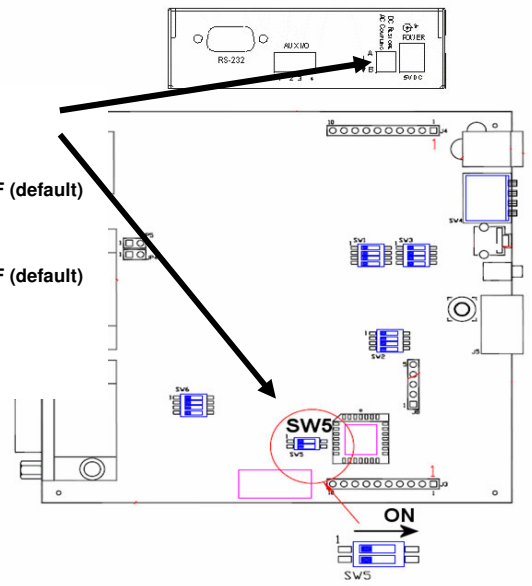


Figure 3: DC Restore / AC Coupling Options

Appendix D Cobra T2 Configuration Settings

Note: **Cobra** transmitters are typically pre-configured at time of order and will have factory configuration indicated in the part number label on the underside of the unit.

The factory configuration may be changed or checked by using the following jumper location diagram as well as Table 5 for jumper settings.

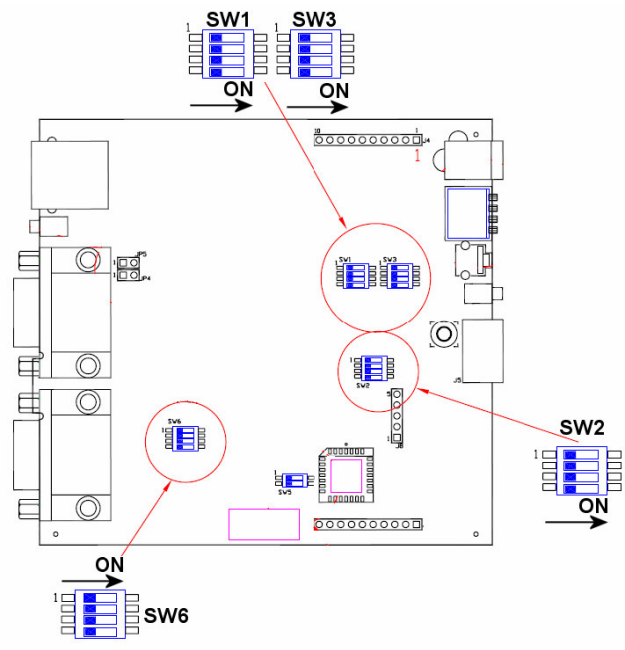


Figure 4: Cobra T2 Jumper Locations and Settings

Table 5: Cobra T2 Configuration Jumper Settings

Configuration Option (all options utilize 4th pair, except special configurations):	SW1	SW2	SW3	SW6
RGBHV Computer Video				
With Left/Right Line Level Audio	1 Off 2 ON 3 Off 4 Off	1 ON 2 ON 3 Off 4 Off	1 Off 2 Off 3 ON 4 ON	1 ON 2 ON 3 ON 4 Off
With SDPIF Digital Audio	1 Off 2 Off 3 ON 4 Off	1 Off 2 Off 3 ON 4 Off	1 Off 2 Off 3 ON 4 ON	1 ON 2 ON 3 ON 4 Off
With Simplex Serial (receive only)	1 ON 2 Off 3 Off 4 Off	1 Off 2 Off 3 Off 4 ON	1 Off 2 Off 3 ON 4 ON	1 ON 2 ON 3 ON 4 Off
With Composite Video	1 Off 2 Off 3 ON 4 Off	1 Off 2 Off 3 ON 4 Off	1 Off 2 Off 3 ON 4 ON	1 ON 2 ON 3 ON 4 Off
With RS232 serial or S2 series (requires separate daughterboard installed)	1 Off 2 Off 3 Off 4 Off	1 Off 2 Off 3 Off 4 Off	1 Off 2 Off 3 Off 4 Off	1 ON 2 ON 3 ON 4 Off
Composite, S-Video, Component Video				
With Left/Right Line Level Audio	1 Off 2 ON 3 Off 4 Off	1 ON 2 ON 3 Off 4 Off	1 Off 2 Off 3 ON 4 ON	1 ON 2 ON 3 ON 4 Off
With SDPIF Digital Audio	1 Off 2 Off 3 ON 4 Off	1 Off 2 Off 3 ON 4 Off	1 Off 2 Off 3 ON 4 ON	1 ON 2 ON 3 ON 4 Off
With Simplex Serial (receive only)	1 ON 2 Off 3 Off 4 Off	1 Off 2 Off 3 Off 4 ON	1 Off 2 Off 3 ON 4 ON	1 ON 2 ON 3 ON 4 Off
With Composite Video	1 Off 2 Off 3 ON 4 Off	1 Off 2 Off 3 ON 4 Off	1 Off 2 Off 3 ON 4 ON	1 ON 2 ON 3 ON 4 Off
With RS232 serial or S2 series (requires separate daughterboard installed)	1 Off 2 Off 3 Off 4 Off	1 Off 2 Off 3 Off 4 Off	1 Off 2 Off 3 Off 4 Off	1 ON 2 ON 3 ON 4 Off
Special configurations:				
Composite Video and Stereo Audio All signals input via HD15 connector (AV mode)	1 Off 2 Off 3 Off 4 Off	1 Off 2 Off 3 Off 4 Off	1 Off 2 Off 3 Off 4 Off	1 Off 2 ON 3 Off 4 Off

Appendix E Serial Daughterboard (SDB) Settings

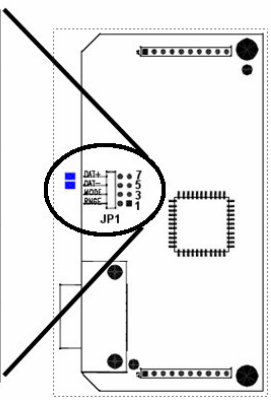
The single-port serial transmitters and single-port and dual daisy chainable serial receivers contain an internal serial daughterboard (SDB) that can be configured for various serial modes. Multi Port Cat5 transmitters do not utilize the SDB and are configured for Mode 1 only.

The SDB hardware configuration is done via jumper settings. These jumpers are used to set the various modes of operation. As shown below. Both ends must be set the same.

To access the SDB on transmitters and receivers:

1. Make sure the unit is powered OFF.
2. If necessary, unplug all cables to the unit.
3. Unscrew the top screw as well as the two set screws in the DB9 connector. Lift the cover off.

Mode	Type	Baud (Max)	JP1 1-2	JP1 3-4
1	Simplex (one way) (to 1500 ft)	115k	OUT	IN
2	Full Duplex (2 way) Short (< 500 ft)	19.2K	OUT	OUT
3/5 Default Setting	**Full Duplex (2 way) Long (to 1500 ft)**	**19.2k**	**IN**	**OUT**
4	Half Duplex (2 way) Long (to 1500 ft)	115k	IN	IN

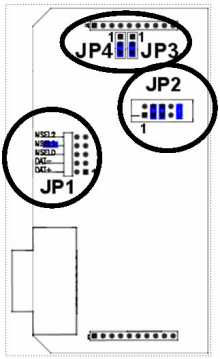


Appendix E Serial Daughterboard (SDB) Settings, cont

The single-port serial transmitters and single-port and dual daisy chainable serial receivers contain an internal serial daughterboard (SDB) that can be configured for various serial modes. Multi Port Cat5 transmitters do not utilize the SDB and are configured for Mode 1 only.

Table 6: Receiver SDB Jumper Settings

Mode	Type	Baud (Max)	JP1	JP2
1	Simplex (one way) (to 1500 ft)	115k	1-2 See Notes 3-4 See Notes 5-6 IN 7-8 OUT 9-10 OUT	1-2 IN 3-4 OUT 5-6 OUT 7-8 OUT 9-10 IN
2	Full Duplex (2 way) Short (< 500 ft)	19.2K	1-2 See Notes 3-4 See Notes 5-6 OUT 7-8 OUT 9-10 OUT	1-2 IN 3-4 OUT 5-6 OUT 7-8 IN 9-10 OUT
3	Full Duplex (2 way) Long (to 1000 ft)	19.2k	1-2 See Notes 3-4 See Notes 5-6 OUT 7-8 IN 9-10 OUT	1-2 IN 3-4 OUT 5-6 OUT 7-8 IN 9-10 OUT
4	Half Duplex (2 way) Long (to 1500 ft)	115k	1-2 See Notes 3-4 See Notes 5-6 IN 7-8 IN 9-10 OUT	1-2 IN 3-4 OUT 5-6 OUT 7-8 IN 9-10 OUT
5* Default	Full Duplex (2 way) Long (to 1500 ft)	19.2k	1-2 OUT 3-4 OUT 5-6 OUT 7-8 IN 9-10 OUT	1-2 OUT 3-4 IN 5-6 IN 7-8 OUT 9-10 IN



**JP3 and JP4 are OUT for all modes except MODE 5. In Mode 5, JP3 and JP4 should be jumpered across pins 2-3.*

Appendix F Rackmounting Units

The Rackmount Kits include brackets for mounting a single transmitter, single receiver, or a single dual daisychainable receiver. Figure 5 shows the 1-Unit Rackmount Bracket , which can be used to mount a single unit on a wall. Figure 6 shows the 4-Unit Rackmount Bracket, which holds four units in a 19" x 1U rack.

Not shown are brackets for 8 units and brackets for series receivers and transmitters. The 8-Unit Rackmount Bracket holds the mounted units like the 4-Unit Rackmount Bracket but is 2U high instead of 1U high, stacking 4 slots directly above 4 slots. The 3-Unit receiver and T4 Transmitter Bracket holds 3 units in a 19" wide x 1U high panel. The 6-Unit receiver and Transmitter Bracket occupies 2U high rack space stacking 3 units atop 3 units.

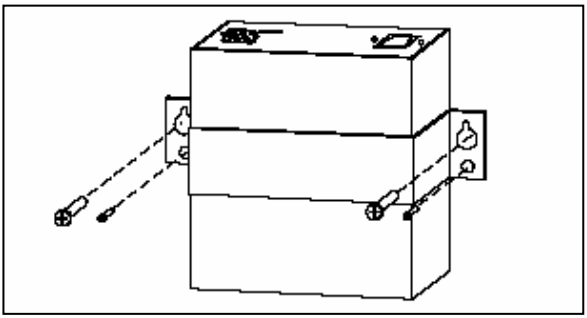


Figure 5: Receiver Mounting Bracket

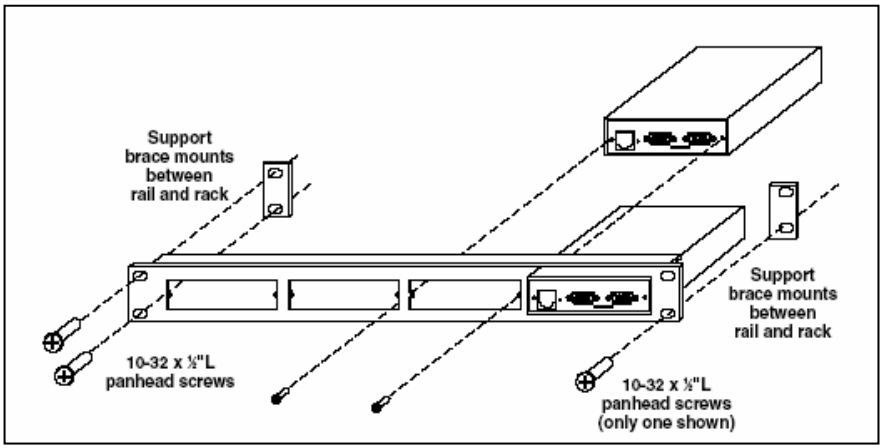

Support brace mounts between rail and rack
10-32 x ½"L panhead screws
Support brace mounts between rail and rack
10-32 x ½"L panhead screws (only one shown)

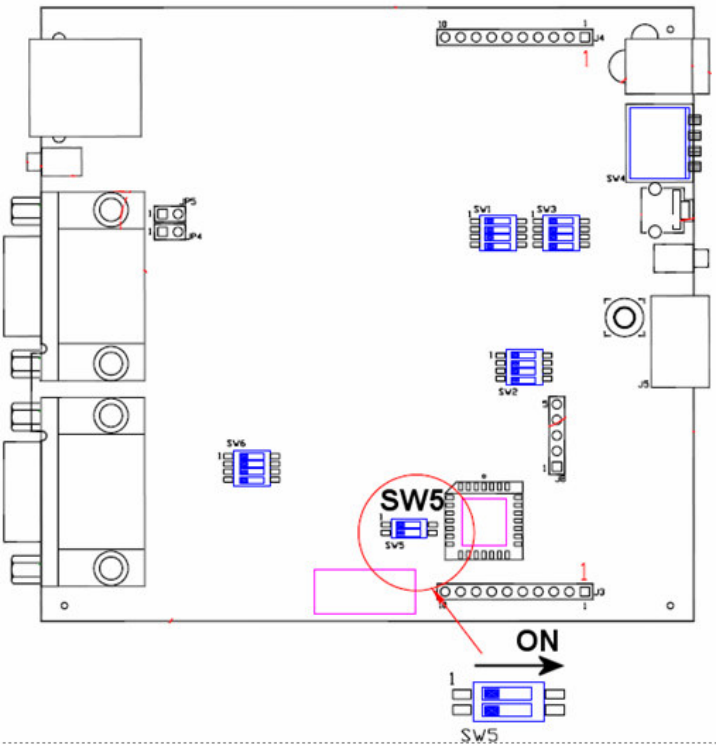
Figure 6: Mounting Bracket

Appendix G Setting Sync Mode

The **Cobra T2** has the capability for fixed and agile sync. The default sync mode setting is for agile sync which replicates the source sync polarity signals. However some displays require a fixed sync polarity that is not possible to change at the video source.

NOTE: Both transmitter and receiver must have the same settings. Not all Kramer **Cobra T2** transmitter/receivers support this function. In this case Agile Sync Mode must be used. Contact technical support for help.

Jumper Setting	SW5
Fixed Sync	1 N/A 2 ON
Agile Sync (default)	1 N/A 2 Off



6 Technical Specifications

Table 7: Technical Specifications[1] of the Cobra T2

CABLE REQUIRED:	Category 5, 5e, 6 shielded or unshielded twisted pair
COMPLIANCE:	CE; FCC Class A, IC Class/class A
VIDEO SUPPORT:	VGA, SVGA, XGA, XGA-2, RGBHV, RGB, Composite, S-Video, Component Video modes
RESOLUTION AND REFRESH RATE:	Up to 1920 x 1200 at up to 60 Hz (receiver dependent)
REQUIRED SOURCE IMPEDANCE:	Video OUT: 75 ohms; Audio models: Audio OUT (if any): 600 ohms maximum SPDIF audio models: 75 Ohm.
REQUIRED DESTINATION IMPEDANCE:	Video IN: 75 ohms; Audio models: Audio IN (if any): 600 ohms minimum SPDIF audio models: 75 Ohm.
AUDIO CHARACTERISTICS:	Channels: Right/Left summed; Line Level 600 Ohm Unbalanced S versions are full stereo audio
SERIAL CHARACTERISTICS:	Protocol: Asynchronous; transparent to data format; transparent to data rates up to 19.2 kbps full duplex; data rates to 115 kbps simplex, half-duplex modes. S2 versions are 3 wire, fixed baud rate of 9600.
CONNECTORS:	(1) 4 position phoenix, (1) RJ-45, (2) HD15 F; 232: (1) DB9 M , (1) RJ-45, (2) HD15 F; S2: (1) 4 position terminal block, (1) DB9 M, (1) RJ-45, (2) HD15 F
TEMPERATURE TOLERANCE:	Operating: 32 to 104°F (0 to 40°C); Storage: -4 to +140°F (-20 to +60°C)
HUMIDITY TOLERANCE:	Up to 80% noncondensing
ENCLOSURE:	Steel
POWER:	+5 VDC; Consumption: 5 watts maximum
SIZE:	1.2"H x 4.2"W x 4.3"D (3.1 x 10.4 x 10.9 cm)
WEIGHT:	1.0 lb. (0.45 kg)
MTBF:	100,000 hours

1 Specifications are subject to change without notice

LIMITED WARRANTY

Kramer Electronics (hereafter *Kramer*) warrants this product free from defects in material and workmanship under the following terms.

HOW LONG IS THE WARRANTY

Labor and parts are warranted for three years from the date of the first customer purchase.

WHO IS PROTECTED?

Only the first purchase customer may enforce this warranty.

WHAT IS COVERED AND WHAT IS NOT COVERED

Except as below, this warranty covers all defects in material or workmanship in this product. The following are not covered by the warranty:

1. Any product which is not distributed by Kramer, or which is not purchased from an authorized Kramer dealer. If you are uncertain as to whether a dealer is authorized, please contact Kramer at one of the agents listed in the Web site www.kramerelectronics.com.
2. Any product, on which the serial number has been defaced, modified or removed.
3. Damage, deterioration or malfunction resulting from:
   i) Accident, misuse, abuse, neglect, fire, water, lightning or other acts of nature
   ii) Product modification, or failure to follow instructions supplied with the product
   iii) Repair or attempted repair by anyone not authorized by Kramer
   iv) Any shipment of the product (claims must be presented to the carrier)
   v) Removal or installation of the product
   vi) Any other cause, which does not relate to a product defect
   vii) Cartons, equipment enclosures, cables or accessories used in conjunction with the product

WHAT WE WILL PAY FOR AND WHAT WE WILL NOT PAY FOR

We will pay labor and material expenses for covered items. We will not pay for the following:

1. Removal or installations charges.
2. Costs of initial technical adjustments (set-up), including adjustment of user controls or programming. These costs are the responsibility of the Kramer dealer from whom the product was purchased.
3. Shipping charges.

HOW YOU CAN GET WARRANTY SERVICE

1. To obtain service on you product, you must take or ship it prepaid to any authorized Kramer service center.
2. Whenever warranty service is required, the original dated invoice (or a copy) must be presented as proof of warranty coverage, and should be included in any shipment of the product. Please also include in any mailing a contact name, company, address, and a description of the problem(s).
3. For the name of the nearest Kramer authorized service center, consult your authorized dealer.

LIMITATION OF IMPLIED WARRANTIES

All implied warranties, including warranties of merchantability and fitness for a particular purpose, are limited in duration to the length of this warranty.

EXCLUSION OF DAMAGES

The liability of Kramer for any effective products is limited to the repair or replacement of the product at our option. Kramer shall not be liable for:

1. Damage to other property caused by defects in this product, damages based upon inconvenience, loss of use of the product, loss of time, commercial loss; or:
2. Any other damages, whether incidental, consequential or otherwise. Some countries may not allow limitations on how long an implied warranty lasts and/or do not allow the exclusion or limitation of incidental or consequential damages, so the above limitations and exclusions may not apply to you.

This warranty gives you specific legal rights, and you may also have other rights, which vary from place to place.

NOTE: All products returned to Kramer for service must have prior approval. This may be obtained from your dealer.

This equipment has been tested to determine compliance with the requirements of:

EN-50081:	"Electromagnetic compatibility (EMC); generic emission standard. Part 1: Residential, commercial and light industry"
EN-50082:	"Electromagnetic compatibility (EMC) generic immunity standard. Part 1: Residential, commercial and light industry environment".
CFR-47:	FCC Rules and Regulations: Part 15: “Radio frequency devices Subpart B Unintentional radiators”

CAUTION!

- Servicing the machines can only be done by an authorized Kramer technician. Any user who makes changes or modifications to the unit without the expressed approval of the manufacturer will void user authority to operate the equipment.
- Use the supplied DC power supply to feed power to the machine.
- Please use recommended interconnection cables to connect the machine to other components.

For the latest information on our products and a list of Kramer distributors, visit our Web site: www.kramerelectronics.com, where updates to this user manual may be found.
We welcome your questions, comments and feedback.

Safety Warning:
Disconnect the unit from the power supply before opening/servicing.

Kramer Electronics, Ltd.
Web site: www.kramerelectronics.com
E-mail: info@kramerel.com
P/N: 2900-650006 REV 2